

## **REMARKS**

### **Pending Claims:**

Claims 1-8 and 32-45 are currently pending in the present application. In a February 7, 2003 telephone conversation with the Examiner, claims 9-31 were withdrawn without traverse and without prejudice to Applicants' right to prosecute these claims in subsequent applications. Applicants submit that no change in inventorship is required due to the withdrawal of claims 9-31. Claims 35-45 have been added. Upon entry of the present Amendment and in view of the following remarks, reconsideration of claims 1-8 and 32-34 and consideration of new claims 35-45 is respectfully requested.

### **Rejections under 35 U.S.C. §103:**

Claims 1-8 and 32-34 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,486,990 to Roberts et al. (hereinafter "Roberts"), in view of U.S. Patent No. 6,148,122 to Cao et al. (hereinafter "Cao").

To be unpatentable under 35 U.S.C. §103(a), the differences between the subject matter sought to be patented and the prior art must be such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the reference teachings. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In addition, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.

### **Independent Claim 1 and Dependent Claims 2-8**

The Office Action states that Roberts discloses a method and means for modulating a polarization-multiplexed optical clock signal for optical communication systems. Applicants

submit that there is no description or even mention of optical polarization-division multiplexing (PDM) as described in the present application in Roberts. Instead, Roberts describes a soliton optical transmission system that uses time-division multiplexing (TDM). See, for example, Roberts, Col. 5, lines 17-18. Applicants submit that PDM and TDM are different signaling technologies.

As described in the present application, beginning on paragraph 7, PDM is a type of optical multiplexing that multiplexes polarized optical pulse trains into a single bit interleaved optical pulse train having at least two polarization states. PDM communication systems have numerous advantages over non-PDM communication systems, such as the communication system described in Roberts. For example, some advantages of a PDM communication system according to the present invention are that the system has greater spectral efficiency, higher dispersion tolerance, and can have double the data capacity as compared with non-PDM systems, such as the communication system described in Roberts.

Independent claim 1 recites, in part, a method that includes splitting a linearly polarized input optical clock signal having a clock rate into a first and a second linearly polarized optical signal. The first linearly polarized optical signal comprises a first polarization state and the second linearly polarized optical signal comprises a second polarization state. The first linearly polarized optical signal is then delayed relative to the second linearly polarized optical signal. The first and the second linearly polarized optical signals are then combined to generate a polarization-multiplexed optical clock signal.

Applicants submit that Roberts does not describe the method for modulating a polarization-multiplexed optical clock signal recited in independent claim 1. Specifically, Applicants submit that there is no description in Roberts of splitting a linearly polarized input optical clock signal into a first and a second linearly polarized optical signal and delaying the first linearly polarized optical signal relative to the second linearly polarized optical signal. Furthermore, Applicants submit that there is no description in Roberts of combining the first and the second linearly polarized optical signals to generate a polarization-multiplexed optical clock signal.

Instead, Roberts describes a system and method for communicating a clock signal in a soliton optical transmission system. The system time division multiplexes a group of data channels into a single channel. A stream of soliton optical pulses having a reduced rate that is equal to the line rate of the pulses divided by an integer ( $N$ ). The stream of soliton optical pulses is modulated with a clock signal that is the  $N^{\text{th}}$  sub-harmonic of the line rate of the soliton pulses. The average energy of the pulses in the  $N^{\text{th}}$  time slot is distinct from the rest of the pulses in the other time slots. This distinction in the average energy can be detected, thereby allowing recovery of the clock signal.

The mention of the term "polarization" in Roberts is in reference to a technique that rotates the polarization of each soliton pulse such that each soliton pulse in the fourth time slot has a polarization that is 90 degrees different than the soliton pulses in the other time slots. This difference in polarization causes the average energy of the pulses in the fourth time slot to be distinct from the average energy of the pulses in the other time slots. See, Roberts Col. 9 lines 33-46. The technique described in Roberts is not polarization-division multiplexing.

The Office Action suggests the use of the polarization-insensitive modulator of Cao as a secondary reference to be combined with the system described in Roberts. Cao described a polarization independent modulator. Applicants submit that combining the soliton optical transmission system using TDM that is described in Roberts with the polarization-insensitive modulator that is described in Cao would not result in the method for modulating a polarization-multiplexed optical clock signal recited in independent claim 1.

In view of the above remarks, Applicants respectfully submit that Roberts and Cao, either alone or in combination do not render amended independent claim 1 and dependent claims 2-8 obvious because all of the limitations are not taught or suggested by the prior art. Therefore, Applicants submit that independent claim 1 is allowable under 35 U.S.C. §103. In addition, Applicants submit that dependent claims 2-8 are allowable as depending from an allowable base claim.

Independent Claim 32 and Dependent Claims 33-34

Independent claim 32 recites, in part, a means for optically splitting an optical clock signal into a first optical signal and a second optical signal where each of the first and the second optical signals have a first and a second polarization state, respectively. Claim 32 also recites a means for delaying the first optical signal relative to the second optical signal. The first polarization state of the first optical signal is then rotated relative to the second polarization state of the second optical signal such that the first polarization state is orthogonal to the second polarization state. Claim 32 further recites a means for optically combining the first and the second optical signals to generate a polarization-multiplexed optical clock signal.

As previously discussed, polarization multiplexing is not described in Roberts. In particular, there is no description in Roberts of a means for optically combining first and second optical signals to generate a polarization-multiplexed optical clock signal. Applicants submit that the system of Roberts is not designed to generate or process polarization multiplexed optical clock signals. Therefore, Applicants submit that Roberts does not teach or suggest any of the claim limitations recited in independent claim 32.

The Office Action suggests the use of the polarization-insensitive modulator of Cao as a secondary reference to be combined with the system described in Roberts. Applicants submit that combining the soliton optical transmission system using TDM that is described in Roberts with the polarization-insensitive modulator that is described in Cao would not result in the polarization-multiplexed optical data modulator recited in independent claim 32.

In view of the above remarks, Applicants respectfully submit that Roberts and Cao, either alone or in combination do not render amended independent claim 32 and dependent claims 33-34 obvious because all of the limitations are not taught or suggested by the prior art. Therefore, Applicants submit that independent claim 32 is allowable under 35 U.S.C. §103. In addition, Applicants submit that dependent claims 33-34 are allowable as depending from an allowable base claim.

New Dependent Claims 35-45

New dependent claims 35-45 depend on independent claim 32. As stated above, Applicants respectfully submit that independent claim 32 is allowable over the prior art of record. Thus, Applicants submit that new dependent claims 35-45 are allowable as depending from an allowable base claim.

**CONCLUSION**

Claims 1-8, 32-45 are currently pending in the present application. Claims 35-45 have been added. In view of the foregoing, reconsideration and allowance of all pending claims (i.e., claims 1-8 and 32-45) is respectfully requested.

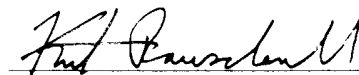
A Petition for a three-month extension of time, up to and including August 27, 2003 is submitted herewith. The Commissioner is hereby authorized to charge the extension fee, the additional claims fee, and any other proper fees to Attorney's Deposit Account No. 501211.

If, in the Examiner's opinion, a telephonic interview would expedite prosecution of the present application, the undersigned attorney would welcome the opportunity to discuss any outstanding issues, and to work with the Examiner toward placing the application in condition for allowance.

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Respectfully submitted,



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